

**IN THE CLAIMS:**

Please change the claims to read as follows:

1. (currently amended) A method for measuring ultralow permeation through an adhesive perimeter ~~a sample~~ using a radioactive compound, which method comprises the steps of:

mounting a ~~sample~~ line of adhesive through which permeation is to be measured between two plates so as to provide controlled access to an upstream surface of the line of adhesive ~~sample~~ in a first chamber and to a downstream surface thereof in a second chamber, wherein said second downstream chamber has a volume of not greater than about 10 cm<sup>3</sup>,

supplying a radioactive gas from a source to be in contact with the upstream surface of the ~~sample~~ line of adhesive in the first chamber,

collecting radioactive gas permeating from the downstream surface of the sample by circulating a very slow flow of dry carrier gas at a rate of not greater than about 1.5 liter per hour through the second chamber to provide a radioactive stream,

flowing said radioactive stream from said second chamber to an entrance to an ionic chamber not greater than about 2 liters in volume containing a beta-particle radiation monitor,

continuously monitoring said stream for beta particle radioactivity and generating signals, and

receiving signals from said radiation monitor in conversion means and converting the signals to calculate the permeation rate through the sample at that moment, whereby the sensitivity of the method allows measurement of permeation of radioactive gaseous compounds through samples lines of adhesive that have barrier properties which permit permeation at rates of less than 0.0001 gm/sq.m/day.

2. (original) The method for measuring permeation according to claim 1 wherein said radioactive gas is tritiated water vapor (HTO).

3. (original) The method for measuring permeation according to claim 2 wherein a relative humidity of HTO between about 85% and 100% is supplied to the first chamber throughout the entire test period for the sample.

4. (original) The method for measuring permeation according to claim 1 wherein said radioactive gas is HTO and said carrier gas is dry methane.

5. (original) The method for measuring permeation according to claim 1 wherein said radioactive gas is carbon<sup>14</sup> monoxide (<sup>14</sup>CO).

6. (original) The method for measuring permeation according to claim 5 wherein said carrier gas is dry argon.

7. (original) The method for measuring permeation according to claim 1 wherein said carrier gas enters said second chamber at a pressure just sufficient to maintain the desired very slow flow and is vented to the atmosphere through an absorption device which removes all of said radioactive compound from said carrier gas stream.

8. (original) The method for measuring permeation according to claim 7 wherein said carrier gas enters at a pressure of not greater than about 1.1 atm.

9-18 (cancelled)

19. (original) A method for testing a perimeter seal including adhesive material for ultralow permeation therethrough using a radioactive compound, which method comprises the steps of:

providing two plates, one of which has an opening therethrough which is spaced from the edges thereof, and assembling said plates so their facing surfaces are spaced substantially equidistant to each other by a continuous seal that includes adhesive material and encircles said opening,

mounting said assembly so as to provide controlled access to said plate containing the opening in a first chamber and to the other plate in a second chamber, supplying a radioactive gas to the first chamber from a source so as to fill the region between said two plates and thus be in contact with an upstream surface of the continuous seal,

collecting radioactive gas permeating from the downstream surface of the perimeter seal by circulating a very slow flow of dry carrier gas at a rate of not greater than about 1.5 liters per hour through the second chamber to provide a collection stream,

flowing said radioactive collection stream from said second chamber to an entrance to an ionization chamber containing a beta-particle radiation monitor,

continuously monitoring said stream for beta-particle radioactivity and generating signals, and

receiving signals from said radiation monitor in conversion means and converting the signals to calculate the permeation rate through the mounted perimeter seal at that moment.

20. (original) The method for testing for permeation according to claim 19 wherein said radioactive gas is either tritiated water vapor (HTO) or  $^{14}\text{CO}$ .

21. (previously presented) Apparatus for measuring ultralow permeation through adhesive material, which apparatus comprises:

a first flat plate having an opening which extends therethrough,  
means for mounting a second flat plate having an area greater than said opening spaced from a downstream surface of said first flat plate by a line of adhesive of defined thickness and width, which adhesive line completely encircles said opening and creates a seal between said plates through which permeation is to be measured,

a first chamber in communication with an upstream surface of said first plate,

a second chamber in communication with the downstream surface thereof, said second downstream chamber having a volume not greater than about  $10\text{ cm}^3$ ,

means for supplying a radioactive gas to the first chamber where it will be in contact with the line of adhesive between said plates,

means for circulating a slow flow of carrier gas through the second chamber to provide a stream containing the radioactive gas permeating through the line of adhesive,

conduit means for flowing said stream from said second chamber to an ionic chamber that contains a radiation monitor for continuously monitoring said stream for beta particle radioactivity and for creating signals indicative of radioactivity, said ionic chamber having a volume not greater than about 2 liters, and

conversion means for receiving signals from said radiation monitor and converting the signals to calculate the permeation rate through the sample at that moment, whereby the sensitivity is such as to detect permeation of radioactive gaseous compounds through a sample line of adhesive that has barrier properties which permit permeation at a rate of less than  $0.0001 \text{ gm/m}^2/\text{day}$ .

22. (new) A method for measuring ultralow permeation through a sample using a radioactive compound, which method comprises the steps of:

mounting a sample through which permeation is to be measured so as to provide controlled access to an upstream surface of the sample in a first chamber and to a downstream surface thereof in a second chamber, wherein said second downstream chamber has a volume of not greater than about  $10 \text{ cm}^3$ ,

supplying carbon<sup>14</sup> monoxide (<sup>14</sup>CO) from a source so as to be in contact with the upstream surface of the sample in the first chamber,

collecting <sup>14</sup>CO permeating from the downstream surface of the sample by circulating a very slow flow of dry carrier gas at a rate of not greater than about 1.5 liter per hour through the second chamber to provide a radioactive stream,

flowing said radioactive stream from said second chamber to an entrance to an ionic chamber not greater than about 2 liters in volume containing a beta-particle radiation monitor,

continuously monitoring said stream for beta particle radioactivity and generating signals, and

receiving signals from said radiation monitor in conversion means and converting the signals to calculate the permeation rate through the sample at that moment, whereby the sensitivity of the method allows measurement of permeation of  $^{14}\text{CO}$  through samples that have barrier properties which permit permeation at rates of less than 0.0001 gm/sq.m/day.

23. (new) The method for measuring permeation according to claim 22 wherein  $^{14}\text{CO}$  is supplied to the first chamber at a pressure slightly above ambient.

24. (new) The method for measuring permeation according to claim 22 wherein said carrier gas is dry argon.

25. (new) The method for measuring permeation according to claim 22 wherein said carrier gas enters said second chamber at a pressure just sufficient to maintain the desired very slow flow and is vented to the atmosphere through an absorption device which removes all of said  $^{14}\text{CO}$  from said carrier gas stream.

26. (new) The method for measuring permeation according to claim 25 wherein said carrier gas enters at a pressure of not greater than about 1.1 atm.

27. (original) The method for measuring permeation according to claim 22 wherein said sample is a polymeric film.

28. (original) The method for measuring permeation according to claim 22 wherein said sample is line of adhesive of uniform width disposed between two flat plates.